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# Alberta Heritage Foundation For Medical Research

## ANNUAL REPORT 1987-88

92-01037/

Sessional Paper No 123/89
1 Session, 22 Legislature

# AHFMR ANNUAL REPORT 1987-88

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Medical Research

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# Letter from the Chairman

On behalf of the Trustees of the Alberta Heritage Foundation for Medical Research, I am pleased to present the Eighth Annual Report covering 1987-88 activities.

On a cumulative basis the Foundation has now provided $250 million in direct funding to Alberta's scientific community and has become the largest single source of research funding to both the University of Alberta and The University of Calgary.

A major goal of the Foundation in its first years was the encouragement of multidisciplinary medical research groups within Alberta's universities. It is a source of great pride and satisfaction for us to witness the growing international reputations which have been gained by the Alberta research groups now coming together, aided and encouraged by the Foundation.

Total expenditures for the year ended March 31, 1988 amounted to $51.2 million compared to $58.5 million in the previous year. A significant portion of these expenditures was the institutional grants given to the Universities of Calgary and Alberta to construct the new Heritage Medical Research Buildings. (Out of a total grant of $54.8 million, $21.7 million was paid in 86/87, $17.1 million in 87/88.)

When these institutional grants are deducted from the total expenditures for each year, it is clear that expenditures for regular scientific programs were reduced from $36.8 million in 86/87 to $34.1 million in 87/88, a reduction of $2.7 million. Program expenditures in 1986/87 were also reduced by $3 million over the previous year.

The Foundation has reduced program expenditures in the last two years as a measured response to the challenge of establishing prudent spending guidelines which, while remaining responsive to the current needs of the Alberta medical scientific community, keeps in perspective the need to maintain the integrity of the Foundation's Endowment Fund in order to meet future financial needs. This issue has been a major pre-occupation of the Trustees of the Foundation for some time and will continue to be a major focus.

Modern concepts of endowment fund management are based upon the conviction that a spending rate should be established as a guideline for expenditures, which, when applied to the market value of the endowment assets, will provide for current spending needs and permit growth in the endowment fund so that future spending will remain on a consistent basis with current spending. In this context, the following tabulation sets out the balance of the Endowment Fund Assets (stated at both cost and market value) at March 31 in each of the last three years.

**Endowment Fund Net Assets at March 31**
(millions of dollars)

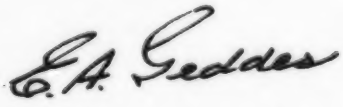
| | 1988 | 1987 | 1986 |
|---|---|---|---|
| At cost | 447 | 449 | 443 |
| At market value | 483 | 529 | 515 |

The Alberta Heritage Foundation for Medical Research Endowment Fund consists of an initial endowment of $300 million from the Alberta Heritage Savings Trust Fund together with cumulative earnings thereon, less cumulative transfers to the Foundation. Transfers to the Foundation are available upon request, provided the payment of such transfers would not result in the net assets of the Endowment Fund, as valued on a cost basis, being less than the initial endowment of $300 million.

The Endowment Fund assets stated at cost have been relatively constant over the past three years and provide a comfortable margin for transferring funds for current purposes within the statutory limitation on such transfers. However, since the Trustees now are moving toward the adoption of a fixed spending rule, applied as a percentage of the market value of the Endowment Fund, we believe there are two related issues which must be addressed. First, we believe that the Foundation's endowment must be supplemented. In our most recent appearances before the Special Committee on the Heritage Savings Trust Fund, we have requested that an additional $150 million be appropriated to the Endowment Fund. This sum would permit us to meet current financial needs and provide for future needs — in short, preserve the financial integrity of the Foundation. The second and related issue deals with the question of asset mix; that is the relative proportions of the assets which should be deployed in equity and debt investments. While the investment decisions concerning the Foundation's Endowment Fund continue to be made by the fund managers, we continue to monitor such activities to contribute to a longer term investment strategy, which can only be put in place when the Foundation's request for a supplement to the Endowment Fund has been satisfied.

Four of the Foundation's original trustees, each of whom has served for eight years, retired at the conclusion of the current year. I would like to acknowledge each of these outstanding individuals and to thank them publicly for the dedicated service. They are Mr. William Dickie, Q.C., of Calgary, Judge Patrick Lawrence of Red Deer, Dr. Roy le Riche, the nominee of the Alberta College of Physicians and Surgeons, and Dr. Robert Francis, the nominee of the M.S.I. Foundation. I would like to thank all of the Trustees for their contributions during the past year. They have all given generously and unstintingly of their time in the interest of the Foundation.

Finally, I would like to acknowledge once again, the many contributions made by our President, Dr. Lionel E. McLeod, and his team at the Foundation's office. Dr. McLeod has continued to play the leading role in developing and maintaining our relationships with the medical research community and a large share of our success is attributable to his strong leadership.



Eric A. Geddes

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The Hon. Mr. Justice Michael Brien O'Byrne, Court of Queen's Bench, Edmonton, Alberta
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Norman Ernest Wagner, Ph.D., President, The University of Calgary

# What We're Doing for Your Health

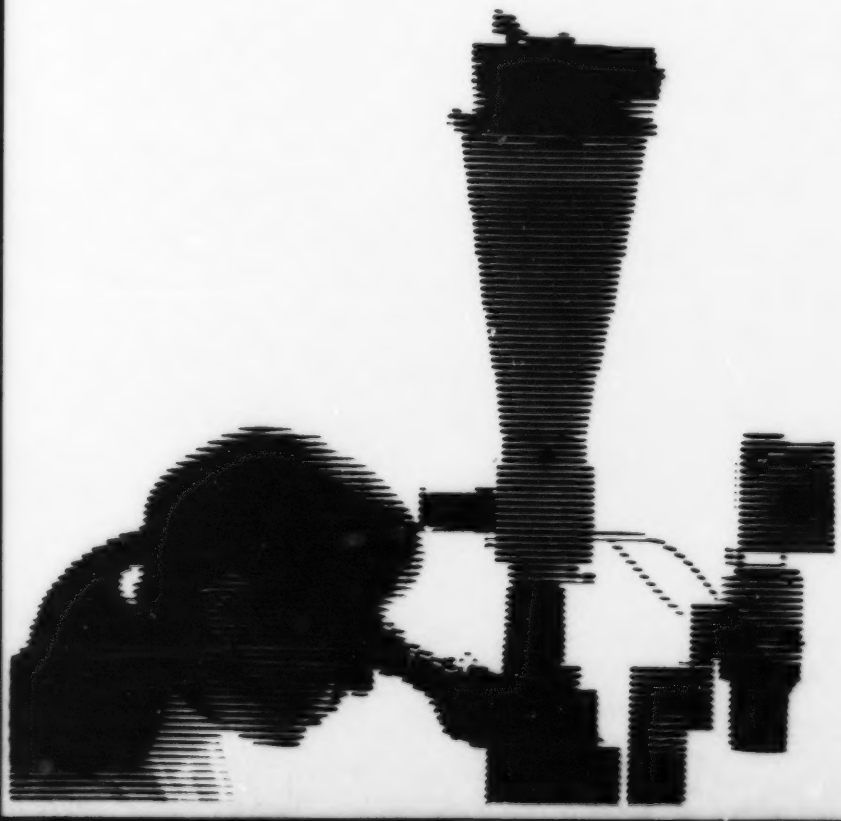
From the now commonplace wonders of vaccinations and antibiotics to dramatic organ transplants and immunotherapy, modern medicine seems quite miraculous. Still we expect more miracles and we ask medical researchers to make them happen.

We are particularly anxious for new answers to the most mysterious, debilitating and fatal diseases where medicine has made relatively little progress. Many of the researchers newly funded by the Foundation during 1987-88 are tackling some of these problems.

Controlling the deadly skin cancer called melanoma and preventing heart attacks are two examples. Another new scientist is unravelling the mystery of crib death. Several others have joined the large group of neuroscientists investigating the nervous system, the most unexplored territory in the human body. Two kidney transplant specialists apply advanced knowledge of immunology to solve rejection problems.

The 115 other scientists supported by the Foundation have not announced any miracles but, as the news items in this report indicate, they are making significant progress in many areas. The awards earned by the young people and the innovations coming out of labs underscore the vitality of Alberta's medical research community. Some of the discoveries have attracted substantial funding from international pharmaceutical and biotechnology companies. Others have become the basis of new Alberta companies that are marketing products internationally.

The material in this Annual Report is only a small sample of ongoing research by Foundation-supported scientists. They work in a wide variety of disciplines to answer basic biological questions about the mechanisms of disease for improved diagnosis, treatment, and prevention. For a complete list of personnel and study areas see page 32. More detailed information is available in The Second Triennial Report and the bimonthly newsletters published by the Foundation.



# Letter from the President

1987-88 held for the Foundation a number of highlights and major achievements. The numbers of new investigators increased significantly, multidisciplinary medical research groups continued to grow in both numbers and size, the offical opening and initial occupancy of the Heritage Medical Research Building at The University of Calgary was on time and within budget. Scientists are attracting more funding from national agencies and private donors. As well, the Foundation's Technology Transfer Program continues to attract serious applications whose outcomes are proving more favorable than early estimates.

Research initiatives are addressing major human problems. A number of promising examples may serve to underscore this observation.

- The use of pharmacological agents to control cardiac dysrhythmia, a common cause of death.
- The role of lipids and lipoproteins causing arteriosclerosis (hardening of the arteries). Control of this defect would be the most important preventive, cost effective, benefit imaginable.
- Better understanding of nerve function and helping patients regain lost function.
- The impact of genetics and the environment on the cause of cancer.
- The identification of new agents which might be useful in treating mental illness.

Many more examples could be cited which would demonstrate the important research of the 125 Foundation-funded scientists and their effective collaboration with others working in Alberta's universities and teaching hospitals. Many investigators pursue fundamental and basic research; the greatest hope for disease prevention, recognition, and control. Others, often using new ideas from their own basic research, work on clinical problems in patient care.

Training programs are attracting excellent candidates across the world. The Clinical Fellowship program, designed to attract physicians, surgeons, and other practitioners to train in research, has exceeded expectations. The numbers of candidates are increasing and, on completing training, the majority pursue research careers, often in Alberta. This single achievement — bringing to Alberta clinician scientists with both research and patient care expertise — makes recent advances available to patients. At the same time, these advances place demands for funding on the health care system.

Alberta has acquired a medical research base from which may grow new and diverse industry. The Foundation's Technology Transfer program is one of the few funding sources for early steps in the commercialization of medical knowledge. A small number of initiatives have been funded and produced new companies which have attracted seed and venture capital investment. Other sources of investment funding for early ventures must be increased as more scientists advance their ideas to stages attractive for investment.

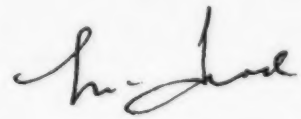
Presentations were made twice this year to the Select Committee of the Heritage Savings Trust Fund. These presentations focussed on the importance of this period in the life of the Foundation. When established in 1980, the Foundation was granted a priming endowment of $300 million. Because the annual expenditures required to build and maintain a medical research base of high quality could not be determined without experience — the Foundation was a unique endeavor — additional funding would be considered later. Within the Act by which the Foundation was incorporated, the Select Committee of the Heritage Savings Trust Fund would, after receiving the report of the first International Board of Review, "reassess whether or not the amount of the Endowment Capital Fund is adequate for the further requirements of the Foundation." With the very favorable report of that Board, the Foundation now awaits that reassessment.

To fulfill our purpose as stated in the Act — establish and support a balanced long-term program of medical research — the Foundation wishes to add a total of some 200 new scientists to Alberta. Two hundred who will, with their other scientific colleagues, have access to ample numbers of students and fellows, and who will work in adequately supported laboratories. Many of these laboratories will be arranged in multidisciplinary clusters in the two new Heritage Medical Research Buildings.

The endowment must be supplemented by adding new funds to fulfill this aim and provide sufficient additional annual income to protect against inflation in perpetuity. The Foundation aims to become self-sufficient as was originally intended by those who set up the endowment.

Reassessment and supplementation are crucial to the maintenance of Alberta's highly favorable momentum and the excellence emerging in our medical research community.

I wish to acknowledge the sincere gratitude of all to those many provincial, national, and international scientists whose advice and criticism permitted the Foundation to fund those applications most likely to bear fruit and to four very special people, the Trustees who retire this year. Each has played an important role in implementing a very remarkable and unique initiative in medical research; the Alberta Heritage Foundation for Medical Research.



Lionel E. McLeod, M.D.

# What is AHFMR?

The Alberta Heritage Foundation for Medical Research is a research-funding organization established in 1979 by the Government of Alberta. The Foundation supports a long-term program of medical research based in the province. Basic and clinical scientists explore a broad spectrum of disciplines such as: biochemistry, microbiology, pediatrics, immunology, neurology, dentistry, pharmacology and many others. Though the majority of scientists investigate causes of disease at the basic molecular level, some are physicians who translate research finding to patient care.

The Foundation is supported by a $300 million endowment fund and its investment earnings. Managed by a group of Trustees, the Foundation stands at arm's length from the government. The Foundation funds scientists through a grants and awards program designed to recruit, support, and train a critical mass of career scientists in Alberta. These awards are allocated in a peer review system and recruitment is carried out in cooperation with the Universities of Alberta and Calgary.

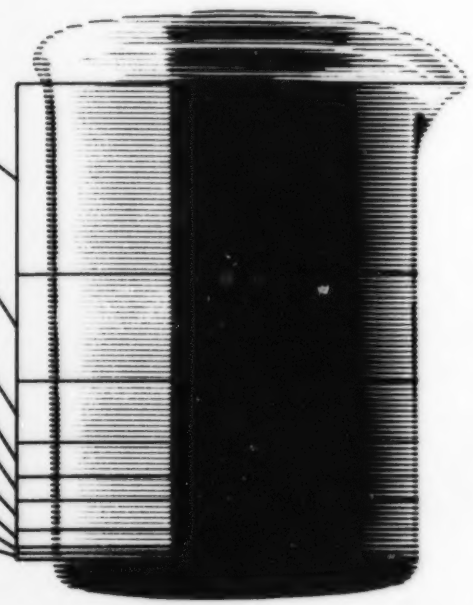
An international Scientific Advisory Council advises the Foundation on major application and general policies to ensure programs meet international standards of scientific excellence. (For membership see page 28.)

The program includes major personnel awards (Heritage Medical Scientist, Heritage Medical Scholar and Clinical Investigator Awards); Studentships and Fellowships; Establishment Grants for new scientists; Visiting Professor, Conference and Technology Transfer Grants. (For more details see page 29.)

The officers of the Foundation are: Dr. Lionel E. McLeod, M.D., F.R.C.P., President and Mr. Alex J. Nykolyn, C.A., Financial Officer.

**AHFMR Expenditures 1987/88**
**Total $51.17 Million**

| | % |
|---|---|
| Research Support Costs and Institutional Grants to Universities** | 41.0 |
| Scholarship/Heritage Medical Scientist Awards, Clinical Investigators, Establishment Grants | 23.7 |
| Fellowship Awards and Research Allowances | 14.0 |
| Studentship Awards and Research Allowances | 7.3 |
| Major Equipment Grants and Maintenance (excluding Establishment Grants) | 4.4 |
| General Research Grants* | 6.5 |
| Administrative Costs | 2.3 |
| Technology Transfer Grants | .4 |
| Scientific Policy and Evaluation Costs | .4 |
| **Total** | **100.0** |



* Conference Grants, Visiting Scientists, Visiting Lecturers and Faculty Travel, Independent Establishment Grants, Independent Research Allowances, Special Initiative Funding, Visiting Professorships and Clinical Traineeships.

** Includes Institutional Grants for planning and construction of new research buildings.

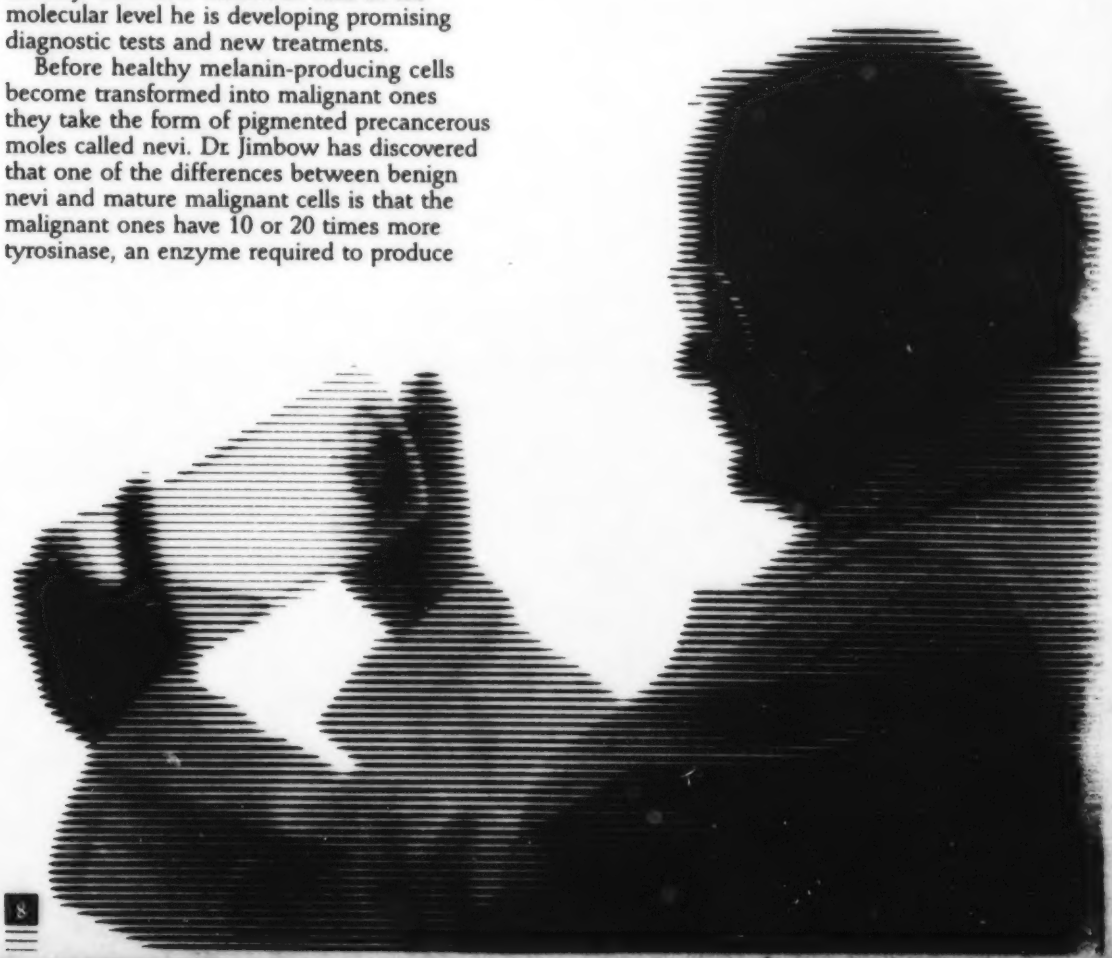
# Battling the Big Killers:

## CANCER AND HEART ATTACKS

### Hope for Melanoma Patients

Malignant melanoma or "mole cancer" is deadly, but if caught in the very early stages it can be controlled. The problem is this: detecting healthy cells from benign ones can be very difficult. Dr. Kowichi Jimbow, a new U of A Heritage Medical Scientist from Japan has spent the last 20 years developing ways to detect and treat melanoma. By comparing healthy cells and cancerous cells at the molecular level he is developing promising diagnostic tests and new treatments.

Before healthy melanin-producing cells become transformed into malignant ones they take the form of pigmented precancerous moles called nevi. Dr. Jimbow has discovered that one of the differences between benign nevi and mature malignant cells is that the malignant ones have 10 or 20 times more tyrosinase, an enzyme required to produce



the pigment melanin. Using this information, he has developed monoclonal antibodies (MAbs) which head directly to normal, benign nevi, or malignant melanoma cells. So far, these MAbs have successfully detected very early cancer in 30% of patients studied. The clinical work is being continued at the Cross Cancer Institute in Edmonton.

Dr. Jimbow's therapeutic studies are still at the animal stage, but look most promising. He has chemically modified tyrosinase to make a compound which is very toxic only to the tumor cells (because these cells have such a strong affinity for tyrosinase). This means the compound would have very few side effects. If the treatment proves successful, related therapy might be developed for other cancers that involve a similar metabolic pathway. Neuroblastoma, a very deadly childhood cancer, is one example.

## Keeping Cardiac Patients Alive

Sudden cardiac death is the number one killer in North America. Every year it kills about 30,000 Canadians, often in the prime of life. Fortunately, some people at risk get a second chance. They survive a heart attack or they experience the life-threatening, irregular heart rhythms that often precede an attack.

There are drugs that can control these arrhythmias. However the drugs only work for about two-thirds of the patients and different drugs work for different individuals. How does a physician decide which drugs to use on a cardiac patient? The choice could literally be a matter of life or death.

The method commonly used involves monitoring the heart rhythms in special exercise tests, trying an antiarrhythmic drug, then retesting. Dr. Brent Mitchell has spent three years evaluating a dramatic second method. It is an invasive procedure that involves pacing the heart with a programmed stimulator, deliberately creating arrhythmias, then testing the effects of drugs on them. The arrhythmias are rapidly eliminated if necessary.

"There is some risk, but it is very much smaller than the benefit," says Dr. Mitchell. 80% of the patients who took drugs identified with the invasive procedure had no recurring episodes of arrhythmias after two years. Only 50% of the patients who underwent the conventional noninvasive procedure had no recurrences.

Dr. Mitchell is also investigating the best way to choose drugs for patients who cannot be helped by the new approach.

Dr. Mitchell works closely with five other Foundation-funded scientists on the U of C cardiac research team, particularly Drs. George Wyse and Henry Duff. In 1987 Dr. Duff and the team were the first to show the striking antiarrhythmic activity of a drug called amiloride in patients who previously did not respond to drug treatment.

## CAST

Last June the U of C team was one of three Canadian groups chosen to participate in $60 million international clinical drug trials for the life-threatening arrhythmias. Run by the National Institutes of Health in the U.S., the trials are designed to determine if drug therapy actually reduces the incidence of sudden cardiac death. Dr. George Wyse, Head of Cardiology at the Foothills Hospital and a Heritage Medical Scholar, says Calgary was chosen because of the combined expertise of the cardiac research team.

Called the Cardiac Arrhythmia Suppression Trial or CAST, the project will enrol 5,000 patients in Canada, Sweden, and the U.S. for placebo controlled, double-blind trials. Participants are assigned to medication or placebo and followed for five years. Physicians throughout Southern Alberta are cooperating to enrol appropriate patients who are carefully screened for suitability. The drugs used have been previously tested in preliminary trials.

# Taking Care of Baby

## Understanding SIDS

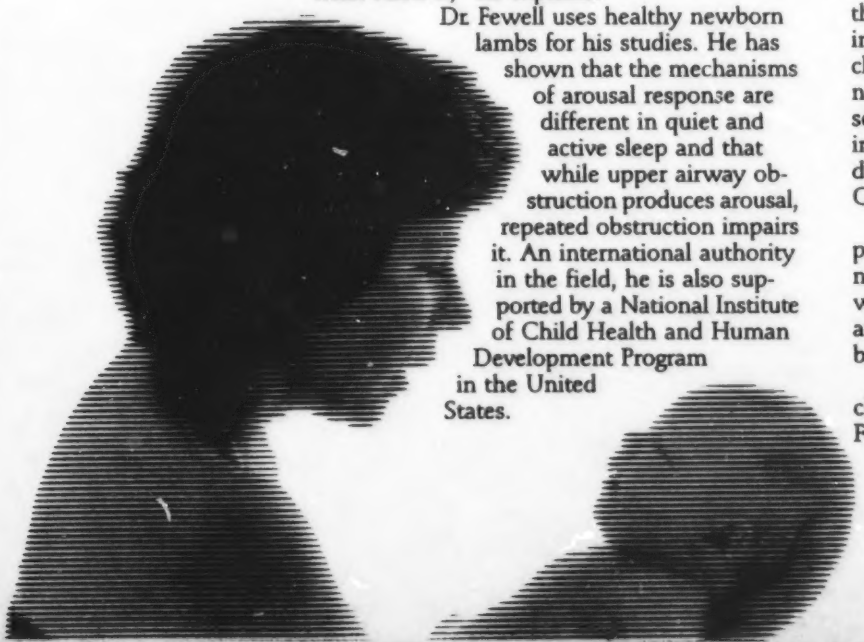
Crib death is one of the most heartbreaking medical mysteries. Nobody knows why a beautiful and apparently healthy baby sleeps peacefully one moment, then is a lifeless form the next. Every year about 80 babies in Alberta die of Sudden Infant Death Syndrome (SIDS).

Traditionally researchers have tried to understand SIDS by exploring what goes wrong — how the heart or lungs fail. Since the infant always dies without warning, it's not surprising the approach has not been very fruitful. Dr. Jim Fewell, a new Heritage Medical Scholar at The University of Calgary, suspects the key may be found by studying healthy babies.

Many scientists believe that SIDS is caused by apnea, a brief period where breathing stops because of an obstructed airway or problems in the central nervous system. Brief periods of apnea are common in adults during sleep, but they are usually harmless because adults have an arousal response which wakes them.

Surprisingly, some British studies showed at least half of normal, healthy babies also have apnea for 10 to 20 seconds without harm. Dr. Fewell suspects that SIDS babies have a faulty arousal response. "The key to understanding crib death may lie in searching for what normally stops apnea rather than what starts it," he explains.

Dr. Fewell uses healthy newborn lambs for his studies. He has shown that the mechanisms of arousal response are different in quiet and active sleep and that while upper airway obstruction produces arousal, repeated obstruction impairs it. An international authority in the field, he is also supported by a National Institute of Child Health and Human Development Program in the United States.



## Preventing Handicaps in Newborns

About three out of every 1,000 full-term babies will have asphyxia at birth — insufficient oxygen to the brain. Most of the asphyxia infants will suffer seizures and half of those who do will have neurological problems. "The handicap may be very severe and recognizable such as cerebral palsy or mental retardation, or it may be subtle, but significant such as a learning disability," says Dr. Finer, Director of the Neonatal Pediatric Intensive Care Unit at the Royal Alexandra Hospital.

Dr. Neil Finer is leading a multi-centre study designed to reduce the number of infants handicapped by term asphyxia. Once babies have seizures they are given barbituates such as phenobarbital to control them. Animal studies show that if phenobarbital is given prophylactically, seizures are reduced; probably because the drug improves oxygen delivery to the brain and helps metabolize sugars for improved nutrition. Dr. Finer's study is designed to see if giving babies phenobarbital before seizures occur will reduce the problem.

The challenge is not a technical one because the procedure is relatively simple, non-invasive, and without risk to the infant. The challenge is organizational — enrolling adequate numbers of babies before they have their first seizure and coordinating physicians in different intensive care units with varying working definitions of asphyxia. 19 physicians in 10 Canadian cities are participating in this study.

The study includes long-term follow-up into preschool years. Hopefully, five years from now physicians will discover asphyxia infants who started out fighting for life in incubators are freer of handicaps than they would have been without the preventive treatment.

This is an example of a special initiatives clinical research project funded by the Foundation.

# Safer Kidney Transplants

Replacing diseased body parts through organ transplantation seems like a science fiction fantasy come true. Kidney transplants lead the field in success—75% of transplanted kidneys survive for five years, freeing the patient from a dialysis machine and reducing health care costs by about $25,000 a year.

The high success rate reflects advances in controlling rejection of the donor kidney by suppressing the patient's immune system with drugs such as cyclosporin. But immunosuppression is far from ideal. Rejection still occurs, particularly in high-risk patients who have many antibodies to most potential donor kidneys. These patients usually wait many years before an acceptable cross-matched negative donor kidney can be found. Sometimes a suitable kidney is not found in time.

Dr. Leendert Paul is seeking new solutions to the rejection problem. He is an internationally renowned transplantation immunologist who has joined the U of C as a Heritage Medical Scientist from the Netherlands. He is also Director of the Transplantation Clinic at the Foothills Hospital.

In the next few years, Dr. Paul expects to be the first to show that perfusing the donor kidney with certain monoclonal antibodies prior to transplantation reduces rejection. He has also found a treatment that decreases the problem of postponed rejection. This occurs when transplanted kidneys fail after functioning well for many years. These immunological studies are relevant to all organ transplantation, particularly heart.

Scientific solutions are not the only way to improve the lot of patients waiting for a suitable donor kidney. Clearly, the system for harvesting and distributing organs is crucial. "To find a suitable kidney for these high risk patients, you need a pool of 1,000 to 5,000 donors," says Dr. Paul. "If we don't collaborate and share organs, these people will never get a kidney." He strongly advocates Western Canadians establish a centrally coordinated system for organ retrieval and distribution, though the actual transplantation could be done at several centres.

## The HLA Response

The Foundation supports another immunologist solving rejection problems in kidney transplants. Dr. Philip Halloran, head of the kidney transplant program at the U of A, has identified some of the molecular mechanisms in the immune response. In rejection the host recognizes structures called HLA antigens on the donor tissue as foreign. Dr. Halloran has found that the donor tissue doesn't express these HLA antigens until the host releases certain molecular signals such as the release of gamma interferon. He has discovered that a monoclonal antibody against gamma interferon can block the process. This is a promising way to reduce rejection by specifically altering one part of the immune system. In contrast, current immunosuppressive treatments knock out many of the immune cells, leaving the patient dangerously vulnerable to infection.

This gamma interferon research includes related studies on diabetes and lupus, two autoimmune diseases in which the body rejects its own tissue.

Dr. Halloran is also exploring how radiation and new combinations of drugs might regulate the rejection process in kidney transplantation.

# Keeping the Live Wires Hot

We all walk around with our own supercomputer — the complex circuitry of cells we call the human brain. The circuit board extends live wires throughout our body to carry electrical messages to and from millions of cells. When the wires are cut through injury or disease, sometimes the body can compensate but often the consequences are disastrous.

Fortunately, scientists are gathering new information about how central and peripheral nerves carry their chemical and electrical messages. During 1987-88 several people were added to the large group of Foundation-funded neuroscientists at the U of A and the U of C. They apply new tools of molecular biology to answer fundamental questions about how nerves work in the hope that they can someday manipulate inactive nerves to regain lost function.

## Nerve Regeneration

Some peripheral nerves do regenerate and regain at least partial function following injury. By analyzing the process at the molecular level using animal nerve cells in cultures, researchers are identifying factors which control this natural regeneration.

Dr. Robert Campenot, a new U of A Scholar has invented a compartmentalized culture system that enables researchers to study nerve growth in new ways. Using the system, he has identified specific ways nerve growth factor and potassium in the nerve's environment influence regeneration.

Dr. Campenot's innovative technology has been adopted by many researchers around the world. For example, scientists in the Parke-Davis pharmaceutical firm use it to screen drugs for Alzheimer's disease.

Dr. Freda Miller, also at the U of A, approaches nerve regeneration through developmental biology. She and colleagues have identified several genes which are expressed in neurons during embryological development. They have found that, under certain circumstances, these genes can be turned on in the mature adult. If Dr. Miller can discover which signals turn the embryonic genes on or off, scientists might be able to deliberately reactivate them to promote nerve repair.

U of C researcher Dr. Henk Zwiers was recruited from the Netherlands to continue his work on the brain peptide, ACTH. ACTH temporarily increases motivation and attention in animals and humans and speeds the recovery of damaged nerves in rats. Dr. Zwiers has discovered that a cell membrane protein called B-50 interacts with ACTH. He suspects it's involved in the ability of nerve tissue to make new neuronal connections, a process essential to learning and remembering. If he can identify the ACTH-like peptide released by B-50, he could synthesize it and use it to stimulate nerve regeneration for Alzheimer's patients or perhaps spinal cord patients.

## Messages Along the Live Wires

U of A researcher Dr. Christina Benishin is investigating the function of nerve endings which touch targets and communicate with them by releasing substances called neurotransmitters. She specifically studies membrane proteins called ion channels which determine the cell's electrical properties. Her work on potassium channels may lead to further understanding of learning, memory, and neurological diseases.

U of C Heritage Medical Scholar Dr. Reuben Gellman looks at nerve action in the cerebellum, the brain area responsible for keeping movements smooth and coordinated. If the cerebellum is disturbed, speech, walking and sequential tasks such as playing the piano are faulty. Dr. Gellman is studying information processing in the cerebellum by analyzing the control of eye movements in animals, and in people with cerebellar damage. Cerebellar damage can be caused by tumors, trauma, genetic disorders, and alcohol abuse.

# Newsfront

### YUPPIE FLU VIRUS LINKED WITH AIDS

U of A researchers have developed a more efficient test for the Epstein Barr virus, the persistent virus that causes mononucleosis and can be reactivated as "chronic mono" or the controversial "yuppie flu". Using the new test with patients from the sexually transmitted disease clinic, researchers found that EBV may compromise the immune system and determine which people at risk for AIDS get the full-blown disease.

*(Drs. Lorne Tyrrell and Francisco Diaz-Mitoma, U of A)*

### NEW APPROACH TO STROKE THERAPY

In animals, lowering blood sugar after stroke ischemia (insufficient oxygen to the brain) results in less brain damage than if blood sugar is left at normal or high levels. This suggests post-stroke insulin therapy could help patients, a particularly valuable finding because stroke occurs without warning.

*(Dr. Roland Auer, Heritage Medical Scholar, U of C)*

### ANTI-FEVER ACTION

The neurotransmitter, arginine vasopressin (AVP) can suppress fever in rats and also appears to help regulate blood pressure. This evidence may lead to new drugs in both areas.

*(Dr. Quentin Pittman, Heritage Medical Scholar, U of C)*

### UNDERSTANDING VIRUS ATTACHMENT

Viruses connect to cells at a binding site called a receptor. The receptor for reoviruses on human red blood cells has been identified.

*(Dr. Patrick Lee, Heritage Medical Scholar, U of C)*

### NATIONAL CENTRE FOR CF RESEARCH

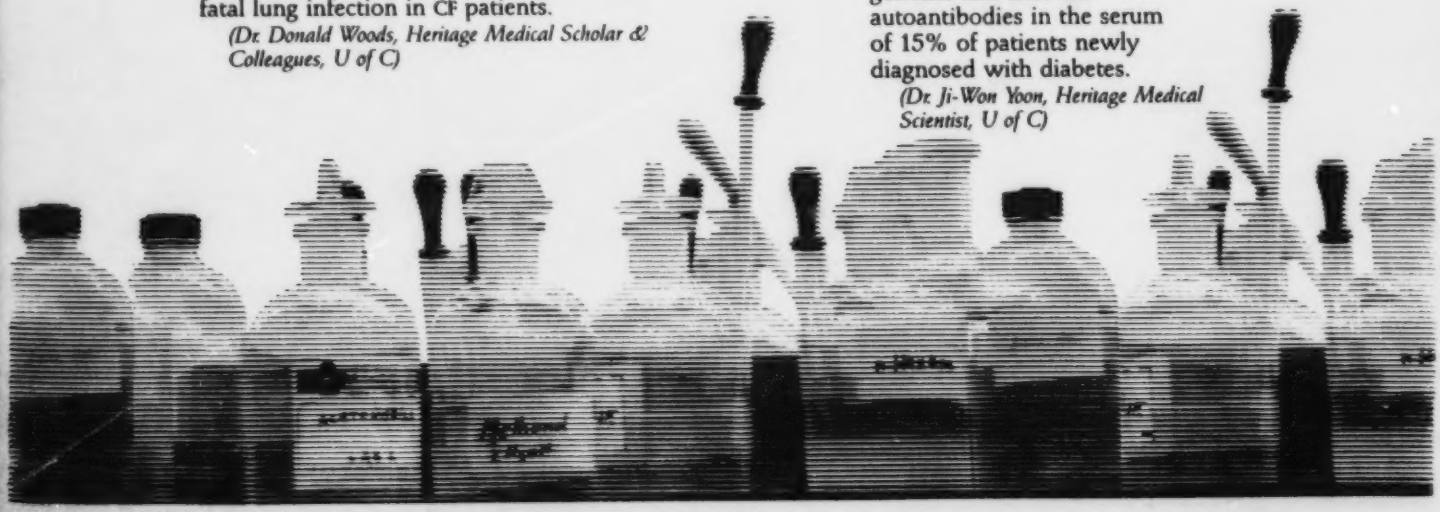
A team of Calgary researchers has been awarded $1.5 million from the Canadian Cystic Fibrosis Foundation to become the national centre for CF lung infection research. The team is investigating ways to control *pseudomonas aeruginosa*, the tiny organism which causes a fatal lung infection in CF patients.

*(Dr. Donald Woods, Heritage Medical Scholar & Colleagues, U of C)*

### THE VIRAL CONNECTION TO DIABETES

One variation of the EMC virus induces insulin-dependent diabetes in animals and a second variation does not. The genetic differences between the two have been identified. A correlation has also been found between the common cytomegalovirus genome and islet cell autoantibodies in the serum of 15% of patients newly diagnosed with diabetes.

*(Dr. Ji-Won Yoon, Heritage Medical Scientist, U of C)*



**AUTISTIC CHILDREN TESTED**

Four-year follow-up studies on preschool autistic children examined the reliability of I.Q. and D.Q. testing. Both were as predictable and stable for autistic children as for nonautistic, language-impaired and mentally handicapped children. However, tests for children of three years and younger tended to overestimate the amount of mental retardation.

*(Dr. Catherine Lord, Heritage Medical Scholar, U of A)*

**HEART ATTACK THERAPY**

Some heart attacks are caused by blocked coronary arteries which do not deliver enough blood to the heart muscle. Structural changes following an attack can cause serious complications. Prolonged nitroglycerin therapy after an attack preserves left ventricular structure and function.

*(Dr. Bodh Jugdutt, Heritage Medical Scholar, U of A)*

**RISK FOR DIABETES**

Genetic susceptibility to insulin dependent diabetes is complicated and involves a minimum of three specific genes on the HLA locus, rather than two as is generally thought.

*(Dr. Leigh Field, Heritage Medical Scholar, U of C)*

**GENE ACTIVITY IN CANCER**

30 new mutants of the human c-src gene have been created. This oncogene is associated with tumor formation and the mutants are valuable new tools to explore the process. Preliminary evidence suggests p60-src, the product expressed by the oncogene, may help regulate cell proliferation.

*(Dr. Don Fujita, Heritage Medical Scholar, U of C)*

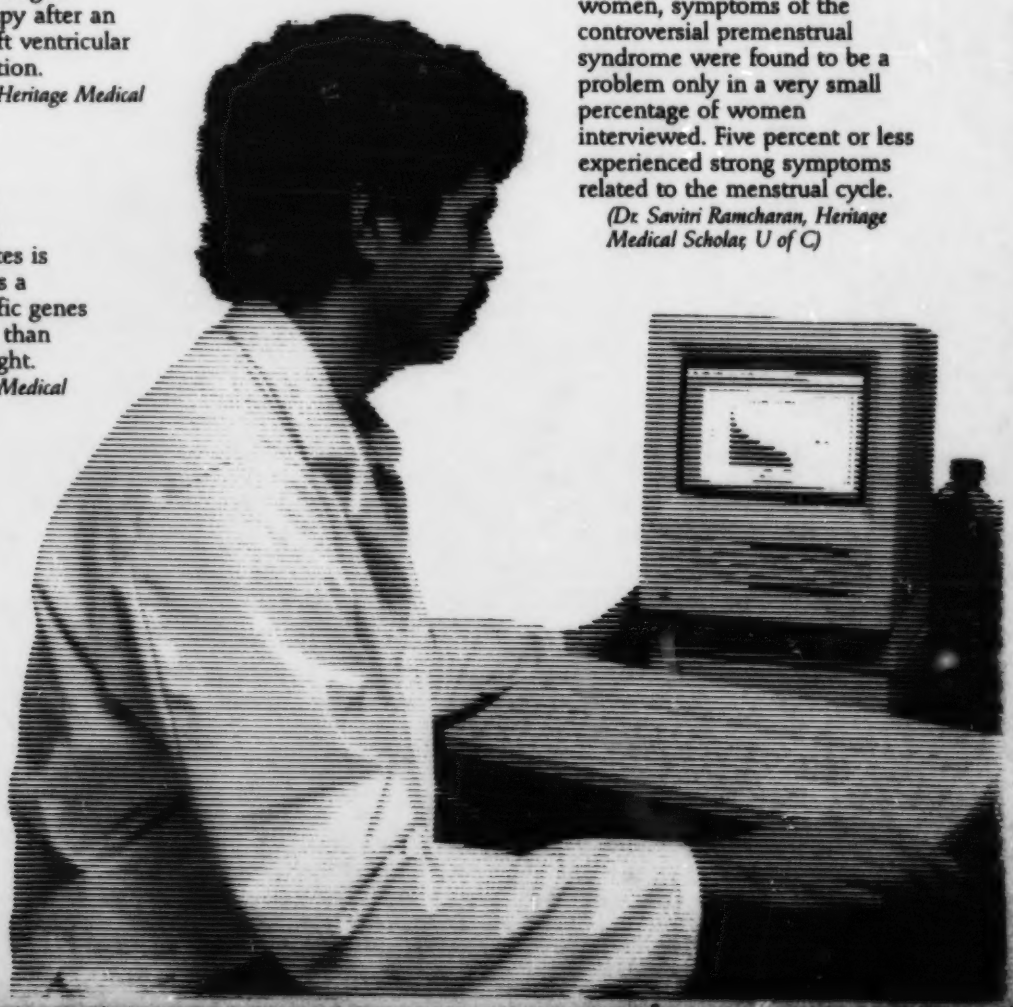
There is new evidence that the most important genes responsible for cancer risk may not be oncogenes which can lead to unregulated cell growth but their opposite — antioncogenes — which must be completely turned off before cancer develops.

*(Dr. Malcolm Paterson, Heritage Medical Scientist, U of A)*

**TRACKING PMS**

In a survey of 6,000 Calgary women, symptoms of the controversial premenstrual syndrome were found to be a problem only in a very small percentage of women interviewed. Five percent or less experienced strong symptoms related to the menstrual cycle.

*(Dr. Savitri Ramcharan, Heritage Medical Scholar, U of C)*



**ANTIDEPRESSANT ACTIVITY**
New information about the action of the two most commonly prescribed antidepressants may explain why some patients do not show clinical progress for about two weeks after they are first treated. The drugs induce a functional decrease in noradrenaline receptor activity. Noradrenaline is a neurotransmitter naturally found in the brain.

*(Dr. Andrew Greenshaw, Heritage Medical Scholar, U of A)*

**REGULATING THE IMMUNE SYSTEM**
Some T-cells in severely burned patients release a very potent substance that blocks the activity of the immune system. This factor may explain why burn victims are so vulnerable to infections. Related preliminary evidence suggests that the inhibitor might be effective in controlling autoimmune diseases.

*(Dr. Doug Green, Heritage Medical Scholar, U of A)*

**ALZHEIMER'S STUDY CENTRE**
The U of C Dementia Clinic is one of four Canadian centres participating in a clinical study of familial Alzheimer's disease. Other Calgary studies focus on the possible causes of the neurofibrillary brain lesions found in Alzheimer's patients.

*(Dr. Irma Parhad, Heritage Medical Scholar, U of C)*

**NEW BIOTECHNOLOGY TECHNIQUE**
The sacB gene of the *Bacillus subtilis* bacterium has been isolated and its expression in a sucrose medium is enhanced by a number of other gene products. This knowledge provides the basis for a new biotechnology system which would use the bacterium to produce medically important proteins.

*(Dr. Sui-Lam Wong, Heritage Medical Scholar, U of C)*

**BATTLING PARASITES**
An antigen has been identified as a very good vaccine candidate for ascariasis, the infection caused by the roundworm, *Ascaris lumbricoides*. The worm infects a quarter of the world's population, primarily in underdeveloped countries where it is often fatal, but some Canadians can also become infected.

*(Dr. Timothy Lee, Heritage Medical Scholar, U of C)*

**CONTROLLING CHOLESTEROL**
A study of lipoproteins suggests a new approach to lowering cholesterol. Lipoproteins are the particles which carry cholesterol in the blood stream. If the synthesis of phosphatidylcholine is inhibited, the secretion of a lipoprotein involved in transport of cholesterol is markedly decreased.

*(Dr. Dennis Vance, Heritage Medical Scientist, U of A)*

**IMPROVED CANCER DETECTION**
A monoclonal antibody developed by Drs. Michael Longenecker and Tony Noujaim effectively detects pelvic cancer earlier than conventional methods.

A team at the Cross Cancer Institute in Edmonton has received a University-Industry grant for $1.3 million from the Medical Research Council of Canada and Biomira, an Edmonton biotechnology company. The grant supports further clinical testing in Edmonton and in future multi-centre trials.

*(Dr. Grant MacLean, Heritage Clinical Investigator, U of A)*

**VIRUS LINKED TO MS**
There is new evidence that multiple sclerosis involves a persistent virus perhaps contracted years before the disease surfaces. In the mouse a viral infection increases demyelination of nerves and this process is mediated by factors in the immune system.

*(Dr. Aimo Salmi, Heritage Medical Scientist, U of A)*

# What We're Doing for Alberta Industry

## Technology Transfer Grants

While they search for new knowledge, scientists funded by the Foundation are developing novel products and technologies for research and health care. This supports new industrial activity in Alberta in two ways. In a few cases, Alberta companies have been formed to market the innovations internationally. Secondly, because of the innovations, Alberta scientists have attracted funding from international pharmaceutical companies and health care manufacturers. This funding not only furthers local research activity, it increases the possibility for future joint ventures with Albertans and well-established Canadian or foreign companies.

The Foundation encourages the university-industrial connection with technology transfer grants which fund the transfer of a new idea or product to the marketplace. Grants of either $25,000 or $75,000 are used primarily to refine the product and to evaluate its commercial potential in the marketplace. The scientists then have a stronger base to attract venture capital. Most important, the concrete benefits of research are moved from the lab and through the marketplace to the bedside.

## Building an Alberta Pharmaceutical Industry

Scientists the world over combat viruses in the pharmacology lab and common cold viruses have been one of the most elusive targets. U of A pharmacist Dr. Ronald Micetich has discovered arildone-derived antiviral agents that work against herpes, picornaviruses and rhinoviruses (a cause of the common cold). On the strength of this research, in 1987 Dr. Micetich founded SynPhar Laboratories Ltd. and Taiho Alberta Ltd., a subsidiary of the Taiho Pharmaceutical Co. Ltd. in Japan. They represent the first major pharmaceutical companies in Western Canada. The Foundation awarded Dr. Micetich a technology transfer grant to support ongoing research and marketing activity while he completed arrangements with investors.

International collaboration is key in other innovative pharmaceutical research at the U of A. The research is both very ancient and very new. Dr. Peter Pang has founded The Traditional Chinese Medicine Program to apply sophisticated pharmacological research techniques to the study of ancient Chinese herbs which have empirically proven effective over thousands of years. Dr. Pang and Co-director Dr. Larry Wang collaborate with scientists in seven Chinese medical colleges. They focus upon herbs used to treat high blood pressure.

The Foundation gave Dr. Pang half a million dollars to establish his laboratory. Subsequently, the program has been awarded $700,000 from the Natural Sciences and Engineering Research Council as part of their University-Industry Program and $1.1 million from an international pharmaceutical company.

Pioneer peptide research by Drs. Robert Hodges and Robert Parker is the basis of a fledgling company, Synthetic Peptides Inc. There is a multi-billion dollar world market for synthetic peptides because they are widely used to make vaccines, drugs, and antibodies for research and diagnosis. A technology transfer grant supported feasibility studies as the company was being formed.

Raylo Chemicals Ltd. of Edmonton, the major world supplier for several synthetic chemical products, is one of the industrial players in the fight against AIDS. Chemists Drs. Wolfgang Muhs and Sing Ping Lee have developed a more efficient process to produce thymidine, the starting ingredient for the AIDS drug called AZT. Currently AZT for one patient costs about $10,000 annually. The new process could make thymidine available at a much more reasonable cost. A technology transfer grant funded some of the work required to scale up the production process.

Still at the initial stages, Dr. Lorne Tyrrell's antiviral research might very likely become another centre for international university/industry collaboration. He has a technology transfer grant to advance work on his discovery of a promising new hepatitis B drug therapy. Hepatitis B is one of the most common and serious viral infections world-wide and there is currently no effective treatment for it.

## Innovations

Some of Alberta's medical researchers are inventors who devise equipment for research or for health care. Their inventions are being patented, tested, and soon will be manufactured and further tested by foreign companies or Alberta companies.

U of C Heritage Medical Scientist Dr. John Remmers has devised an improved sleeping mask to control sleep apnea. Commonly called "snoring disease" apnea is a debilitating and sometimes fatal condition affecting about 2% of the population. Technology transfer grants have allowed him to refine the prototype and approach industrial manufacturers.

Two Foundation-funded cardiologists are devising new instruments for research and health care. Dr. Frank Witkowski has invented a three-dimensional electrophysiological mapping system to directly measure how defibrillation therapy affects cardiac muscles. Dr. Henk ter Keurs is engineering a dynamic electronic caliper for measuring items in motion such as cells in flux or a beating heart.

Dr. Richard Stein and his team at the U of A have designed an improved artificial leg with an innovative knee joint that operates more like a natural leg than available prostheses do. It could easily be manufactured in Alberta.

Drs. Stephen Krawetz and Tom Keenan at the U of C have developed a cost-effective computer-video system for analyzing research data such as the information used to map genes responsible for hereditary diseases.

Dr. Kimron Shapiro has developed a microcomputer test for visual and auditory screening in doctors' offices.

## Designer Tools

As researchers study life in unprecedented molecular detail they often need customized laboratory tools which don't exist on the market. Dr. Jonathan Tyler designs such tools. He is Director of the new Biomedical Design Facility at the U of A.

The Foundation has contributed half a million dollars to the facility and the Faculty of Medicine $300,000 over five years. Dr. Tyler expects the facility to eventually become self-supporting with revenue from technology transfer activity.

So far the response from researchers has been excellent and Dr. Tyler has designed items such as a specialized miniature NMR probe for studying muscle proteins and viruses, and a device to measure residual irradiation in radiation therapy for prostate cancer.

## Laser Wizardry

The magic of lasers is revolutionizing certain kinds of surgery, particularly eye surgery. Recently scientists have begun to use laser light to treat tumors, unclog atherosclerotic arteries, remove birth marks, and zap gall-stones. U of A engineer Dr. John Tulip is improving laser technology with several innovations. He has developed a portable miniature $CO_2$ laser more convenient for hospital use, a dental laser, and a YAG laser that is superior to conventional ones because it has a dual capacity to cut and cauterize. Two technology transfer grants supported Dr. Tulip's market research for his new company, Aurora Laser Ltd.

# Scientists Win Honors

Dr. Cy Frank, Heritage Medical Scholar at the U of C won the 1987 American Orthopedic Society for Sports Medicine Award for Excellence in Research. The award recognized his pioneer basic research relating to ligament transplants. Dr. Robert Bray, an AHFMR Fellow working with Dr. Frank, received the 1988 Canadian Orthopedic Research and Education (CORE) Research Award for his part in the ligament healing studies.

U of C Heritage Medical Scholar Dr. Thomas Reh was one of two Canadians awarded a prestigious 1987 Alfred P. Sloan Fellowship from the Sloan Foundation, New York. He uses the optic nerve of the frog to investigate nerve regeneration. Two German scientific societies honored U of A Scholar Dr. Wolfgang Schneider with the 1987 Gabor Szasz Prize and the 1987 Curt Adam Prize. The awards recognized his work on the low density lipoprotein receptor.

Four AHFMR Fellows were honored for their work during 1987. Drs. Les Nagata (University of Southern California) and Dr. Francisco Diaz-Mitoma (U of A) were two of four North Americans given a 1987 Young Investigator Award from the American Society for Microbiology. Two U of A Fellows were honored for work on chronic vasospasm. Dr. Lew Disney won the 1987 Congress of Neurological Surgeons Resident Award and Dr. Michael Nosko won the 1986 American Academy of Neurological Surgery Award.

Dr. Tom Clandinin won the 1988 Borden Award from the Canadian Society for Nutritional Sciences. The award recognized his many contributions in the field of dietary fatty acid balance. For example, he has shown that fatty acid changes in diet alter animal membranes and immune responsiveness. A PhD student in Dr. Clandinin's lab, Catherine Field, won the 1987 American Institute of Nutrition Graduate Student Research Prize for her finding that diets high in polyunsaturated fats improve the response of fat cells to insulin in diabetic animals.

Dr. Anne Alvarez, a Fellow in Dr. Eldon Smith's lab at the U of C, won the Regional (Alberta) American College of Cardiology Young Investigators' Award for developing new computerized techniques to measure atherosclerosis with high frequency echocardiography.

# From Calgary to Thailand

*"Research facilities in Thailand are relatively sophisticated by Western standards and the set-up is therefore ideal for in-depth studies of human diseases."*

Every year 220 million people in the world contract acute malaria. The majority of cases are caused by an organism called *Plasmodium falciparum*. Researchers like Dr. May Ho hope to eventually reduce that number.

A U of C Heritage Clinical Investigator, Dr. Ho is investigating the immune response to *P. falciparum* as a key step in developing an effective malarial vaccine. Logically, she conducts her research and patient studies in an area where there are abundant cases — Thailand. Her work at Mahidol University in Bangkok allows her to help other Calgary scientists establish field studies. Her expertise also benefits the U of C training programs and local research in microbiology and infectious diseases.

# Statistics

**TABLE 1: New Grants and Awards Implemented for the 1987-88 Award Year**

**Number and Value of Grants and Awards***

| Award Category | U of A | U of C | Others | Total |
|---|---|---|---|---|
| Studentship | | | | |
| – Full-Time | $ 231,592 ( 17) | $ 414,500 ( 28) | $ – | $ 646,092 ( 45)[1] |
| – Part-Time | 6,000 ( 2) | – | – | 6,000 ( 2) |
| – Summer | 419,829 (111) | 296,008 ( 75) | 12,000 ( 3) | 727,837 (189) |
| Fellowship | | | | |
| – Full-Time | 584,206 ( 19) | 746,098 ( 23) | 410,156 (15) | 1,740,460 ( 57)[1] |
| – Part-Time | 25,500 ( 3) | 8,500 ( 1) | – | 34,000 ( 4)[1] |
| Independent Research Allowance | | | | |
| – Studentship | 8,042 ( 3) | 2,500 ( 1) | – | 10,542 ( 4) |
| – Fellowship | 10,000 ( 2) | 11,100 ( 3) | – | 21,100 ( 5) |
| Clinical Fellowship | 51,500 ( 1) | 350,576 ( 7) | 301,044 ( 7) | 703,120 ( 15)[1] |
| Clinical Investigatorship/ – Establishment Grant † | 293,668 ( 2) | 296,140 ( 3) | – | 589,808 ( 5) |
| Clinical Traineeship | – | – | – | – |
| Scholarship/Establishment Grant † | 980,177 ( 6) | 1,336,831 ( 6) | – | 2,317,008 ( 12) |
| Heritage Medical Scientist/ Establishment Grant † | 561,000 ( 1) | – | – | 561,000 ( 1) |
| Independent Establishment Grant | 1,792,774 ( 7) | – | – | 1,792,774 ( 7) |
| Major Equipment Grant | 1,230,170 ( 8) | 220,414 ( 4) | 53,615 ( 2) | 1,504,199 ( 14) |
| Conference Grant | 121,000 ( 6) | 9,000 ( 2) | 17,350 ( 2) | 147,350 ( 10) |
| Technology Transfer Grant | | | | |
| – Phase I | – | 75,000 ( 3) | – | 75,000 ( 3) |
| – Phase II | 75,000 ( 1) | – | – | 75,000 ( 1) |
| Visiting Scientist | | | | |
| – To Alberta | 121,500 ( 4) | 32,425 ( 2) | – | 153,925 ( 6) |
| – From Alberta | – | 6,500 ( 2) | – | 6,500 ( 2) |
| Visiting Professor | 1,625 ( 2) | 1,375 ( 1) | 1,175 ( 1) | 4,175 ( 4) |
| **TOTALS** | **$6,513,583 (195)** | **$3,806,967 (161)** | **$795,340 (30)** | **$11,115,890 (384)** |

Notes: * - Values shown are committed amounts.
† - Values shown are committed amounts for approved Establishment Grants only.
[1] - Includes $2,500 per Full-Time Studentship and Part-Time Fellowship awards, $5,000 per Full-Time Fellowship awards and $7,500 per Clinical Fellowship awards.

**TABLE 2: Summary of Applications Received and Processed during the 1987-88 Award Year**

**Number of Applications Processed**

| Award Category | U of A Total | A | R | O | U of C Total | A | R | O | Others Total | A | R | O | Totals Total | A | R | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Studentship | | | | | | | | | | | | | | | | |
| – Full-Time | 115 | 15 | 31 | 64 | 86 | 5 | 15 | 56 | 1 | 0 | 0 | 1 | *202 | 20 | 46 | 121 |
| – Part-Time | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 |
| – Summer | 211 | 98 | 107 | 6 | 106 | 48 | 57 | 1 | 8 | 0 | 8 | 0 | 325 | 146 | 172 | 7 |
| Fellowship | | | | | | | | | | | | | | | | |
| – Full-Time | 90 | 5 | 27 | 48 | 82 | 6 | 22 | 46 | 23 | 2 | 7 | 12 | *195 | 13 | 56 | 106 |
| – Part-Time | 1 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 1 | 1 |
| Clinical Fellowship | 7 | 1 | 3 | 3 | 11 | 2 | 4 | 5 | 12 | 2 | 3 | 7 | 30 | 5 | 10 | 15 |
| Clinical Investigatorship/ – Establishment Grant | 6 | 1 | 1 | 4 | 4 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 10 | 3 | 3 | 4 |
| Scholarship/ Establishment Grant | 14 | 2 | 9 | 3 | 11 | 2 | 3 | 6 | 1 | 1 | 0 | 0 | 26 | 5 | 12 | 9 |
| Heritage Medical Scientist/ Establishment Grant | 4 | 1 | 1 | 2 | 6 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 10 | 4 | 3 | 3 |
| Independent Establishment Grant | 8 | 1 | 1 | 6 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 10 | 2 | 1 | 7 |
| Major Equipment Grant | 35 | 0 | 26 | 9 | 32 | 0 | 12 | 20 | 3 | 0 | 3 | 0 | 70 | 0 | 41 | 29 |
| Conference Grant | 9 | 6 | 3 | 0 | 4 | 3 | 1 | 0 | 2 | 2 | 0 | 0 | 15 | 11 | 4 | 0 |
| Technology Transfer Grant – Phase I | 0 | 0 | 0 | 0 | 7 | 2 | 3 | 2 | 2 | 2 | 0 | 0 | 9 | 4 | 3 | 2 |
| Technology Transfer Grant – Phase II | 2 | 1 | 1 | 0 | 5 | 1 | 3 | 1 | 4 | 0 | 2 | 2 | 11 | 2 | 6 | 3 |
| Visiting Scientist | | | | | | | | | | | | | | | | |
| – To Alberta | 8 | 5 | 3 | 0 | 5 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 13 | 6 | 7 | 0 |
| – From Alberta | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 3 | 0 |
| Visiting Professor | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 5 | 4 | 1 | 0 |
| **TOTALS** | **515** | **138** | **216** | **146** | **367** | **78** | **132** | **139** | **58** | **11** | **23** | **22** | **940** | **227** | **371** | **307** |

A = Approved R = Rejected O = Withdrawn/Pending

* 15 of the Studentship and 20 of the Fellowship applications were approved but not funded.

## TABLE 3: Grants and Awards Renewed/Continued - 1987/88

| Award Category | U of A Total | U of C Total | Others Total | Total |
|---|---|---|---|---|
| Studentship | | | | |
| – Full-Time | 73 | 72 | 2 | 147 |
| – Part-Time | 3 | 0 | 0 | 3 |
| Fellowship | | | | |
| – Full-Time | 53 | 46 | 23 | 122 |
| – Part-Time | 1 | 1 | 0 | 2 |
| Independent Research Allow | | | | |
| – Student | 6 | 5 | 0 | 11 |
| – Fellow | 1 | 3 | 4 | 8 |
| Clinical Fellowship | 5 | 10 | 8 | 23 |
| Clinical Investigatorship/ – Establishment Grant | 5 | 4 | 0 | 9 |
| Scholarship/Establishment Grant | 30* | 55** | 1 | 86 |
| Heritage Medical Scientist/ Establishment Grant | 3 | 8 | 1 | 12 |
| **TOTALS** | **177** | **204** | **39** | **420** |

* (3) Scholars supported for 3 months only
** (1) Scholar supported for 3 months only

## TABLE 4: Total Awards Active on March 31, 1988

| Award Category | U of A Total | U of C Total | Others Total | Totals |
|---|---|---|---|---|
| Clinical Investigatorship /Establishment Grant | 8 | 7 | 0 | 15 |
| Heritage Medical Scientist /Establishment Grant | 4 | 8 | 1 | 13 |
| Heritage Scholarship /Establishment Grant | 36 | 60 | 1 | 97 |
| **TOTALS** | **48** | **75** | **2*** | **125** |

* Cross Cancer Institute Awards

ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH

# FINANCIAL STATEMENTS
March 31, 1988

# Auditor's Report.

To the Trustees of the Alberta
Heritage Foundation for Medical Research

I have examined the balance sheet of the Alberta Heritage Foundation for Medical Research as at March 31, 1988 and the statements of revenue and expenditure and revenue surplus for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, these financial statements present fairly the financial position of the Foundation as at March 31, 1988 and the results of its operations and the changes in its financial position for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Donald D. Salmon

C.A.
Auditor General

Edmonton, Alberta
July 20, 1988

ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH

# BALANCE SHEET
## as at March 31, 1988

| | 1988 | 1987 |
|---|---|---|
| **ASSETS** | | |
| Cash | $6,282,595 | $3,108,083 |
| Accounts receivable (Note 4) | 227,764 | 214,563 |
| Advances and prepaid expenses (Note 5) | 2,044,555 | 14,985 |
| Mortgages receivable from research scientists | 542,595 | 619,200 |
| Fixed assets | 184,363 | 232,470 |
| | **$9,281,872** | **$4,189,301** |
| **LIABILITIES AND SURPLUS** | | |
| Accounts payable | $1,388,113 | $4,022,986 |
| Revenue surplus | 7,893,759 | 166,315 |
| | **$9,281,872** | **$4,189,301** |

The accompanying notes are part
of these financial statements.

ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH

# STATEMENT OF REVENUE AND EXPENDITURE
## for the year ended March 31, 1988

| | 1988 | 1987 |
|---|---|---|
| **REVENUE** | | |
| Transfers from the Alberta Heritage Foundation for Medical Research Endowment Fund | $58,000,000 | $53,000,000 |
| Interest | 894,610 | 756,826 |
| | **58,894,610** | **53,756,826** |
| **EXPENDITURE** | | |
| Scientific programs: | | |
| Building program grants | 17,099,290 | 21,726,500 |
| Scholarship and establishment grants | 8,558,838 | 9,368,187 |
| Fellowship grants and research allowances | 5,587,655 | 6,448,950 |
| Studentship grants and research allowances | 3,721,790 | 3,830,499 |
| Research support costs | 2,523,851 | 2,581,670 |
| Major equipment and maintenance grants | 2,292,672 | 2,498,884 |
| Heritage medical scientist grants | 1,954,393 | 2,447,231 |
| Independent establishment grants | 1,734,557 | 1,053,357 |
| Clinical investigatorship grants | 1,653,267 | 1,290,973 |
| Clinical fellowship grants | 1,597,927 | 1,437,739 |
| Institutional grants | 960,106 | 2,126,546 |
| Special initiative grants | 442,636 | 444,253 |
| Visiting lecturer grants to universities | 362,346 | 316,067 |
| Travel grants to universities | 246,269 | 216,188 |
| Technology transfer grants | 185,049 | 584,800 |
| Technical workshop grants | 181,900 | – |
| Visiting scientist grants | 159,876 | 101,352 |
| Conference support grants | 129,657 | 292,455 |
| Library grants | 118,300 | – |
| Computer grants | 100,000 | – |
| Independent research allowances | 98,614 | 125,515 |
| Recruitment and planning grants to universities | 30,889 | 21,942 |
| Visiting professor honoraria and travel grants | 9,250 | 6,716 |
| Clinical trainee grants | – | 10,564 |
| | 49,749,132 | 56,930,388 |
| Administration expenses, Schedule 1 | 1,064,812 | 1,111,101 |
| Scientific Advisory Council expenses | 139,827 | 114,001 |
| Trustee expenses | 112,647 | 127,757 |
| Other committee expenses | 100,748 | 230,469 |
| | **51,167,166** | **58,513,716** |
| Excess (deficiency) of revenue over expenditure for the year | **$ 7,727,444** | **$ (4,756,890)** |

# STATEMENT OF REVENUE SURPLUS
## for the year ended March 31, 1988

| | 1988 | 1987 |
|---|---|---|
| Revenue surplus at beginning of year | $ 166,315 | $4,923,205 |
| Excess (deficiency) of revenue over expenditure for the year | 7,727,444 | (4,756,890) |
| Revenue surplus at end of year | **$7,893,759** | **$ 166,315** |

# NOTES TO THE FINANCIAL STATEMENTS
March 31, 1988

## Authority

The Alberta Heritage Foundation for Medical Research operates under the authority of the Alberta Heritage Foundation for Medical Research Act, Chapter A-26, Revised Statutes of Alberta 1980, as amended.

## Significant Accounting Policies and Reporting Practices

**Fixed Assets:**
Fixed assets are stated at cost less accumulated depreciation and amortization.

**Changes in Financial Position:**
A statement of changes in financial position is not provided as disclosure in these financial statements is considered to be adequate.

**Scientific Program Expenditures:**
Building program grants are reported as expenditures as costs are incurred. Other grants and allowances awarded by the Trustees of the Foundation are recorded as expenditures when the awardee has been notified of the amount of the award and all terms and conditions of eligibility for payment of the award have been met.

**Pension Plan:**
Effective April 1, 1987 the Foundation adopted prospectively the Canadian Institute of Chartered Accountants' recommendations on accounting for pension costs and obligations.

The Foundation's plan is a defined benefit plan. Benefits are based on years of service and average salary in the final years of employment.

The plan status as at March 31, 1988 is as follows:

| | |
|---|---|
| Assets | $273,800 |
| Actuarial value of accrued pension benefits | 181,000 |
| Excess balance | **$ 92,800** |

The excess balance is being amortized over the expected average remaining service life of the employees covered by the plan which is currently 13 years. Accordingly, the amounts contributed to the pension plan by the Foundation will be reduced.

## Alberta Heritage Foundation for Medical Research Endowment Fund

The Endowment Fund operates pursuant to the Alberta Heritage Foundation for Medical Research Act and consists of an initial endowment of $300,000,000 from the Alberta Heritage Savings Trust Fund together with cumulative earnings thereon, less cumulative transfers to the Foundation.

Transfers to the Foundation are available upon request provided the payment of such transfers would not result in the net assets of the Endowment Fund, as valued on a cost basis, being less than the initial endowment.

The net assets of the Endowment Fund at March 31, 1988, as valued on a cost basis, amounted to approximately $447,000,000 and on a market value basis, to approximately $483,000,000.

## Accounts Receivable

| | 1988 | 1987 |
|---|---|---|
| Unexpended grants held by universities: | | |
| Travel | $130,167 | $130,736 |
| Visiting Lecturer | 81,100 | 81,146 |
| | 211,267 | 211,882 |
| Other | 16,497 | 2,681 |
| | **$227,764** | **$214,563** |

## Advances and Prepaid Expenses

| | 1988 | 1987 |
|---|---|---|
| Advances on building program grants | $2,029,855 | $ – |
| Prepaid administration expenses | 14,700 | 14,985 |
| | **$2,044,555** | **$14,985** |

## Commitments

As at March 31, 1988 the Foundation had committed $38,310,268 (1987 – $54,216,418) for scientific programs:

| | |
|---|---|
| Scholarship and establishment grants | $14,554,530 |
| Building program grants | 9,117,584 |
| Heritage medical scientist grants | 3,082,543 |
| Fellowship grants and research allowances | 2,810,672 |
| Institutional grants | 2,144,660 |
| Studentship grants and research allowances | 2,066,923 |
| Clinical investigatorship grants | 1,988,039 |
| Independent establishment grants | 1,303,821 |
| Clinical fellowship grants | 573,006 |
| Special initiative grants | 318,031 |
| Major equipment and maintenance grants | 202,556 |
| Conference support grants | 71,889 |
| Visiting scientist grants | 67,789 |
| Other grants and allowances | 8,225 |
| | **$38,310,268** |

These commitments pertain to the following fiscal years:

| | |
|---|---|
| 1988-89 | $26,111,710 |
| 1989-90 | 6,163,001 |
| 1990-91 | 3,617,528 |
| 1991-92 | 1,892,411 |
| 1992-93 | 489,179 |
| 1993-94 | 36,439 |
| | **$38,310,268** |

## Comparative Figures

The 1987 figures have been reclassified where necessary to conform to 1988 presentation.

## Approval of Financial Statements

These financial statements were reviewed by the Audit Committee and recommended to the Trustees for their approval.

ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH

# SCHEDULE OF ADMINISTRATION EXPENSES
for the year ended March 31, 1988

Schedule 1

| | 1988 | 1987 |
|---|---|---|
| Salaries | $ 532,420 | $ 541,936 |
| Rental of premises | 114,597 | 101,675 |
| Public relations and advertising | 77,087 | 100,307 |
| Employee benefits | 70,013 | 69,295 |
| Depreciation and amortization | 59,942 | 62,321 |
| Stationery, printing and office supplies | 49,191 | 84,495 |
| Consultancy | 33,035 | 14,611 |
| Maintenance | 31,033 | 22,647 |
| Travel and accommodation | 20,770 | 27,532 |
| Postage and courier | 19,238 | 20,939 |
| Insurance | 18,818 | 14,419 |
| Vehicle | 16,661 | 14,645 |
| Telephone | 13,377 | 18,830 |
| Legal | 7,650 | 8,353 |
| Staff training | 283 | 3,627 |
| Miscellaneous | 697 | 5,469 |
| | **$1,064,812** | **$1,111,101** |

# Scientific Advisory Council

The 13-member Scientific Advisory Council includes representatives from the national and international research communities. They review and advise the Foundation on major applications and policy decisions related to research. The members are:

Dr. Lionel E. McLeod, President, Alberta Heritage Foundation for Medical Research

*Dr. Lawrence E. Bryan, Professor and Head, Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary, Calgary, Alberta

*Sir Alastair Currie, former Professor of Pathology, Edinburgh University, and Pathologist, Royal Infirmary of Edinburgh, Scotland

**Professor H. John Evans, Director, MRC Clinical and Population Cytogenetics Unit, Western General Hospital, Edinburgh, Scotland

**Dr. Wolfgang K. Joklik, Chairman, Department of Microbiology and Immunology, Duke University Medical Centre, Durham, North Carolina

**Dr. Laurence A. Harker, Director, Roon Research Center for Arteriosclerosis and Thrombosis, Department of Basic and Clinical Research, Research Institute of Scripps Clinic, La Jolla, California

*Dr. David M. Kipnis, Busch Professor of Medicine, Chairman, Department of Medicine, Washington University School of Medicine, St. Louis, Missouri

*Dr. Robert G. Lee, Professor and Head, Department of Clinical Neurosciences, Foothills Hospital, Calgary, Alberta

**Dr. Lloyd D. MacLean, Edward W. Archibald Professor, Chairman, Department of Surgery, McGill University, Montreal, Quebec

*Dr. Hugh O. McDevitt, Professor and Chairman, Department of Medical Microbiology, Stanford University School of Medicine, Stanford, California

*Dr. James V. Maloney, Jr., Louis D. Beaumont Professor of Surgery and Associate Dean, Department of Surgery, UCLA School of Medicine, Center for the Health Sciences, Los Angeles, California

Dr. Joseph B. Martin, Julieanne Dorn, Professor of Neurology, Chief Neurology Service, Massachusetts General Hospital, Boston, Massachusetts

Dr. Antony H. Melcher, Professor of Dentistry and Associate Dean, Life Sciences, School of Graduate Studies, Faculty of Dentistry, University of Toronto, Toronto, Ontario

**Dr. Daniel Porte, Jr., Associate Chief of Staff for Research and Development, Head, Division of Endocrinology and Metabolism, University of Washington, Seattle, Washington

Dr. Aser Rothstein, former Professor of Medical Biophysics, Director of Medical Research Institute, The Hospital for Sick Children, Toronto, Ontario

Dr. David L. Sackett, Professor, Departments of Clinical Epidemiology and Biostatistics and Medicine, McMaster University, Hamilton, Ontario

**Dr. Bishnu D. Sanwal, Professor, Department of Biochemistry, The University of Western Ontario, London, Ontario

Dr. René Simard, Vice-President Academic and Research, Université de Montréal, Montreal, Quebec

*Dr. David L. Tyrrell, Chairman, Department of Medical Microbiology and Infectious Diseases, University of Alberta, Edmonton, Alberta

* Term ended during 1987/88

** New Members as of March 9, 1988

# Programs of the Foundation

**Heritage Medical Scientist Awards**
This award is designed to encourage the recruitment and establishment of senior medical scientists to Alberta. A Heritage Medical Scientist is a leader in his field and is internationally recognized for his scientific contributions.

Alberta investigators with a record of outstanding research, whose stipend from competitive funding agencies (MRC, NSERC, AHFMR, etc.) is scheduled to terminate are also eligible.

**Scholarships**
Alberta Heritage Medical Research Scholarships support investigators recently trained in medical research who have demonstrated promise and ability to initiate and conduct independent research. A five-year, renewable Scholarship allows scientists to develop medical research unhampered by heavy teaching and service duties.

Scholarships are granted by competition and based upon the excellence of the candidate, the originality and importance of the project, and the quality of the proposed research environment.

**Clinical Investigatorships**
Clinical Investigatorships give clinically qualified medical scientists holding full-time academic appointments further research training and experience assisted by competitively-funded basic or clinical researchers. Clinical investigators must have an M.D. or D.D.S., have completed clinical specialty training and two or three years of supervised medical research. The three-year award may be extended for three years but is not renewable.

**Independent Establishment Grants for New Investigators**
Heritage Medical Research Independent Establishment Grants are given to new investigators who are not funded by the Foundation (who may or may not hold an award from another research granting agency). This grant is designed to help new investigators quickly achieve maximal research productivity by providing equipment, technical assistance, materials and supplies.

**Fellowships**
Heritage Medical Research Fellowships provide qualified candidates with full-time post-doctoral training in research in an area of medical science relevant to the aims of the Foundation. Fellows must have an M.D., D.D.S., D.V.M., Ph.D., Pharm.D., or equivalent degree and must demonstrate high academic standing and evidence of research ability.

**Clinical Fellowships**
Clinical Fellowships give individuals who have completed clinical training an opportunity to gain supervised medical research experience. The applicant must have a medical or dental degree obtained within the last ten years and have completed subspecialty clinical training. The one-year award may be renewed three times.

**Studentships**
The Foundation provides three types of awards: Full-time, Part-time, and Summer Studentships.

There are a limited number of Full-time Studentships for students registered in full-time M.Sc. or Ph.D. programs, and who plan careers in medical research. The University must accept students into a graduate program and invite students to apply for an AHFMR Studentship. Studentships are granted by competition based on excellence.

A limited number of Part-time Studentship awards are available to full-time students working towards professional health-related degrees. Research required by the curriculum is not eligible for support.

Summer Studentship awards support promising Alberta university students who wish to spend their summer months (May to August) engaged in medical research.

**Technology Transfer Grants**
The Technology Transfer program is designed to provide a unique opportunity for Alberta medical researchers or engineers to promote university/industrial collaboration in Alberta, stimulate technological innovation in Alberta, and advance medical research to the stage where private investors may provide seed capital.

Phase I grants enable applicants to strengthen the technical merit and explore the feasibility of a scientifically sound project.

Phase II grants apply when a product or technique has been identified and laboratory tested but requires further investigation and refinement to attract seed/ venture capital.

**Visiting Scientists**
Awards for Visiting Scientists to Alberta enable a limited number of highly innovative and productive medical scientists to engage in medical research in an Alberta university for the purpose of bringing special knowledge and expertise to the host department, group, or institution.

Awards for Visiting Scientists from Alberta enable Alberta medical scientists to undertake collaborative research which they are unable to undertake locally due to inadequate technology or collegial expertise. Research funded must be an obvious step in the progression of a sustained research effort on the part of the Visiting Scientist.

**Conference Grants**
The Foundation supports a limited number of conferences and workshops clearly related to the enhancement of medical research in Alberta and the transmission of significant new knowledge to those responsible for the management of patients.

Conference support is usually limited to the funding of a small number of distinguished medical scientists invited to participate as special lecturers or major participants. Funds also support a limited number of workshops on collaborative research and workshops which explore and evaluate new research findings.

**Visiting Lecturers**
The Visiting Lecturer program helps Alberta universities attract outstanding medical scientists who can broaden and enrich the educational experience of graduate students and fellows. The program also gives Alberta investigators, individually or in groups, the opportunity to discuss their research with other experts in their field of medical research.

**Travel Grants**
The Foundation annually gives Travel Grants to The University of Alberta and The University of Calgary to be administered by the Universities for the following purposes:

- Attendance of faculty members at workshops, conferences, and annual meetings.
- Recruitment of researchers.
- Short visits to discuss complicated experimental design and cooperative research.
- Short visits to other laboratories to study new research techniques and to host external investigators who can assist in establishing new techniques.

**Visiting Professors**
Heritage Medical Research Visiting Professorships are available for the purpose of recognizing and attracting truly outstanding medical scientists to visit Alberta to enrich and enhance the climate of medical research within the universities and the affiliated institutions.

**Grants for Major Equipment**
Major Equipment grants permit the university on behalf of investigators to purchase equipment essential to high-quality research. Applications usually relate directly to research projects supported by competitive granting agencies.

Grants for Equipment Maintenance ensure adequate maintenance of major equipment wholly funded by the Foundation's Major Equipment Grants. Preference is given to expensive facilities providing support to groups of researchers and multidisciplinary projects, especially those facilities offering services to researchers with partial or full recovery arrangement for regular operating costs.

## Applications Advisory Committee Members

DR. W.L. ALBRITTON, Professor and Head, Faculty of Medicine (Microbiology), Univ. of Sask.
DR. R. ANDERSON, Associate Professor, Faculty of Medicine (Microbiology & Infectious Diseases), U of C
DR. M. BALA, Professor & Head, Dept. of Medicine, University Hospital, Saskatoon, Sask.
DR. W.A. BRIDGER, Chairman, Faculty of Medicine (Biochemistry), U of A
DR. L. BRYAN, Professor & Head, Faculty of Medicine (Microbiology & Infectious Diseases), U of C
DR. P. CODDING, Associate Professor, Faculty of Science (Chemistry), U of C
DR. J. EGGERMONT, Professor, Faculty of Social Sciences (Psychology), U of C
DR. EM. EGGERT, Associate Professor, Faculty of Dentistry (Stomatology), U of A
DR. C.B. FRANK, Assistant Professor, Faculty of Medicine (Surgery), U of C

DR. A. FRENCH, Professor, Faculty of Medicine (Physiology), U of A
DR. H. FRIESEN, Head, Faculty of Medicine (Physiology), U of Manitoba
DR. M. FRITZLER, Professor, Faculty of Medicine (Medicine & Medical Biochemistry), U of C
DR. W. GILES, Professor, Faculty of Medicine (Medicine & Medical Physiology), U of C
DR. H.J. GOREN, Professor, Faculty of Medicine (Medical Biochemistry), U of C
DR. D. GREEN, Assistant Professor, Faculty of Medicine (Immunology), U of A
DR. P. HALLORAN, Professor, Faculty of Medicine (Nephrology), U of A
DR. M. HALPERIN, Professor, Faculty of Medicine (Medicine), U of Toronto
DR. D.A. HANLEY, Associate Professor, Faculty of Medicine (Internal Medicine), U of C
DR. D. HART, Professor, Faculty of Medicine (Microbiology & Infectious Diseases and Medicine), U of C
DR. R. HODGETTS, Professor, Faculty of Science (Genetics), U of A
DR. J.A. HOFFER, Associate Professor, Faculty of Medicine (Medical Physiology & Clinical Neurosciences), U of C
DR. K. IATROU, Associate Professor, Faculty of Medicine (Medical Biochemistry), U of C
DR. C. KAY, Professor, Faculty of Medicine (Biochemistry), U of A
DR. E. KNAUS, Professor, Faculty of Pharmacy, U of A
DR. P. LEE, Associate Professor, Faculty of Medicine (Microbiology & Infectious Diseases), U of C
DR. R. LEE, Professor & Head, Faculty of Medicine (Clinical Neurosciences & Medicine), U of C
DR. C. LORD, Associate Professor, Faculty of Medicine (Pediatrics), U of A and Glenrose Hospital
DR. S.F.P. MAN, Professor, Faculty of Medicine (Pulmonary Medicine), U of A
DR. A. MATHESON, Dean of Science, Professor, Faculty of Medicine (Biochemistry & Microbiology), U of Vic
DR. E.E. McCOY, Professor, Faculty of Medicine (Pediatrics), U of A
DR. H. McLENNAN, Professor, Faculty of Medicine (Physiology), UBC
DR. R. MURPHY, Chairman, Faculty of Medicine (Anatomy & Cell Biology), U of A
DR. E NARGANG, Associate Professor, Faculty of Science (Genetics), U of A
DR. M. PALCIC, Assistant Professor, Faculty of Agriculture & Forestry (Food Science), U of A
DR. M. PATERSON, Professor, Faculty of Medicine (Biochemistry), U of A and Cross Cancer Institute
DR. K. PEARSON, Professor, Faculty of Medicine (Physiology), U of A
DR. A. PROCHAZKA, Professor, Faculty of Medicine (Neurosciences), U of A
DR. R. RAJOTTE, Associate Professor, Faculty of Medicine (Surgery & Clinical Surgery), U of A
DR. J. REMMERS, Professor, Faculty of Medicine (Medicine), U of C
DR. D.A.K. RONCARI, Julia McFarlane Professor of Diabetes Research, Faculty of Medicine, U of C
DR. S.H. ROTH, Professor, Faculty of Medicine (Pharmacology & Therapeutics and Anaesthesia), U of C
DR. W. SCHNEIDER, Associate Professor, Faculty of Medicine (Biochemistry), U of A
DR. D. SCRABA, Professor, Faculty of Medicine (Biochemistry), U of A
DR. E. SHAFFER, Professor and Head, Faculty of Medicine (Medicine), U of C
DR. B. SINGH, Associate Professor, Faculty of Medicine (Immunology), U of A
DR. E. SMITH, Professor & Head, Faculty of Medicine (Medicine), U of C
DR. H. TER KEURS, Professor, Faculty of Medicine (Medicine & Medical Physiology), U of C
DR. D.L. TYRRELL, Chairman & Professor, Faculty of Medicine (Medical Microbiology & Infectious Diseases and Medicine), U of A
DR. J. VAN DE SANDE, Professor, Faculty of Medicine (Medical Biochemistry), U of C
DR. M. WALSH, Associate Professor, Faculty of Medicine (Medical Biochemistry), U of C
DR. J. WEINER, Professor, Faculty of Science (Biochemistry), U of A
DR. W. WENMAN, Associate Professor, Faculty of Medicine (Pediatrics), U of A
DR. W. WHITELAW, Professor, Faculty of Medicine (Medicine), U of C
DR. E WITKOWSKI, Associate Professor, Faculty of Medicine (Cardiology), U of A
DR. D. WOODS, Associate Professor, Faculty of Medicine (Microbiology & Infectious Diseases), U of C

# Personnel

## Heritage Medical Scientists

**1987-88 Additions:**

BRINDLEY, David, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta, "Control of Glycerolipid and Lipoprotein Metabolism"

JIMBOW, Kowichi, M.D., Ph.D., Department of Medicine, Faculty of Medicine, University of Alberta, "Melanogenesis and Laboratory Diagnosis and Rational Therapy of Malignant Melanoma"

PAUL, Leendert, M.D., Ph.D., Department of Medicine, Faculty of Medicine, University of Calgary," "Organ Transplant: Program of Clinical and Experimental Research"

**Current:**

ALLEN, Peter, Ph.D., Department of Applied Sciences in Medicine, Faculty of Medicine, University of Alberta "Imaging and Biochemical Applications of NMR to Medicine"

DAVISON, Joseph, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Nervous Control of Gastrointestinal Secretions"

MALONEY, John, Ph.D., Department of Obstetrics and Gynecology, Faculty of Medicine, University of Calgary "The Physiology and Development of the Fetus and Neonate"

McGHEE, James, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Gene Expression During Animal Development"

PATERSON, Malcolm, Ph.D., Department of Medicine, Cross Cancer Institute, "Clinical Genetics and Molecular Carcinogenesis"

REMMERS, John, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Control of Breathing by the Nervous System"

SALMI, Aimo, M.D., Ph.D., Department of Medical Microbiology and Infectious Diseases, Faculty of Medicine, University of Alberta "Immunopathogenesis of Neurovirological Diseases"

TER KEURS, Henk, M.D., Ph.D., Departments of Medicine and Medical Physiology, Faculty of Medicine, University of Calgary "Activation and Contraction of the Heart"

TYBERG, John, M.D., Ph.D., Departments of Medicine and Medical Physiology, Faculty of Medicine, University of Calgary "Cardiac Mechanics: Factors Affecting the Heart's Pumping Action"

VANCE, Dennis, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta "Phospholipid and Lipoprotein Metabolism"

WANG, Jerry, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Studies in Cell Regulation"

YOON, Ji-Wong, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Two Possible Mechanisms for the Pathogenesis of Virus-Induced Diabetes Mellitus"

## Heritage Medical Scholars

**1987-88 Additions:**

BENISHIN, Christina, Ph.D., Department of Physiology, Faculty of Medicine, University of Alberta, "Presynaptic Modulation of Potassium Channels"

CAMPENOT, Robert, Ph.D., Department of Anatomy and Cell Biology, Faculty of Medicine, University of Alberta, "Control of Nerve Fiber Growth and Survival by Ions, Pharmacological Agents and Electrical Activity"

FEWELL, James, Ph.D., Departments of Obstetrics and Gynecology and Medical Physiology, Faculty of Medicine, University of Calgary, "Cardiorespiratory Control During Sleep"

GALLIN, Warren, Ph.D., Department of Zoology, Faculty of Science, University of Alberta, "Cellular Mechanisms of Development"

GELLMAN, Reuben, Ph.D., Departments of Clinical Neurosciences and Medical Physiology, Faculty of Medicine, University of Calgary, "Processing of Oculomotor Signals in the Cerebellum"

LEE, Timothy, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary, "Protective Immunity to Nematode Infection"

MARTIN-IVERSON, Mathew, Ph.D., Department of Psychiatry, Faculty of Medicine, University of Alberta, "Behavioral Functions of Dopamine Receptor Subtypes: Animal Models of Schizophrenia, Parkinson's Disease and Stimulant Addiction"

MICHALAK, Marek, Ph.D., Department of Pediatrics, Faculty of Medicine, University of Alberta, "Ca Transport Systems in Mature and Developing Heart"

MILLER, Freda, Ph.D., Department of Anatomy and Cell Biology, Faculty of Medicine, University of Alberta, "Molecular Analysis of Neuronal Development"

MITCHELL, L. Brent, M.D., Department of Medicine, Faculty of Medicine, University of Calgary, "Prophylactic Therapy for Ventricular Tachyarrhythmias"

WONG, Norman, M.D., Department of Medicine, Faculty of Medicine, University of Calgary, "Mechanism of Thyroid Hormone Action"

ZWIERS, Hindrik, Ph.D., Departments of Medical Physiology and Medical Biochemistry, Faculty of Medicine, University of Calgary, "Neuropeptides, Phosphoproteins, and Neural Plasticity"

**Current:**

ANDERSON, M. John, Ph.D., Department of Pharmacology and Therapeutics, Faculty of Medicine, University of Calgary "Development of the Neuromuscular Junction"

ANDERSON, Robert, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Control of Virus Synthesis and Assembly"

AUER, Roland, Ph.D., M.D., Department of Pathology, Faculty of Medicine, University of Calgary "Neuronal Death in Ischemia, Hypoglycemia, and Epilepsy"

BAZETT-JONES, David, Ph.D., Departments of Anatomy and Medical Biochemistry, Faculty of Medicine, University of Calgary "Ultrastructure of Transcription Complexes"

BEFUS, Dean, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Studies of Intestinal Immunity and Mast Cells"

BLASDEL, Gary, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Development of Thalamocortical Afferents"

BLEACKLEY, Robert, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta "Molecular Genetics of T Cell Differentiation"

BOISVERT, Donald, Ph.D., M.D., Department of Surgery, Faculty of Medicine, University of Alberta "Pathophysiology and Therapy of Cerebrovascular Occlusion"

*BOURNE, Gregory, Ph.D., Department of Physiology, Faculty of Medicine, University of Alberta "The Regulation of Testicular GnRH Receptors and GnRH-like Peptides and Their Roles in Steroidogenesis"

BOWLING, Douglas, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Projections of Single Identified Retinal Axons"

BULLOCH, Andrew, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Cellular Basis of Adult Neuronal Plasticity"

CLANDININ, Michael, Ph.D., Departments of Foods and Nutrition and Medicine, Faculties of Home Economics and Medicine, University of Alberta "Nutrition and Metabolism of Dietary Fat"

CODDING, Penelope, Ph.D., Departments of Chemistry and Pharmacology and Therapeutics, Faculties of Science and Medicine, University of Calgary "Molecular Structure and Function Studies of CNS Active Drugs and Toxins"

*DASGUPTA, Mrinal, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "MBP-Specific CIC in Multiple Sclerosis"

DAY III, Rufus, Ph.D., Department of Medicine, Cross Cancer Institute "DNA Repair and Gene Regulation in Human Tumor Systems"

DELAY, Michael, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Excitation-Contraction Coupling in Muscle"

DUFF, Henry, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Mechanistic Approach to Antiarrhythmic Therapy"

EGGERMONT, Jos, Ph.D., Department of Psychology, Faculty of Social Sciences, University of Calgary "Functional Plasticity of the Auditory Nervous System"

FAMIGLIETTI, Edward, M.D., Ph.D., Department of Anatomy, Faculty of Medicine, University of Calgary "Functional Architecture of Vertebrate Retina"

FIELD, L.Leigh, Ph.D., Department of Pediatrics, Faculty of Medicine, University of Calgary "The Genetics of Susceptibility to Insulin-Dependent Diabetes"

FINEGOOD, Diane, Ph.D., Department of Physiology, Faculty of Medicine, University of Alberta "Hepatic Insulin Action and Insulin Resistance"

FOTEDAR, Arun, Ph.D., M.D., Department of Immunology, Faculty of Medicine, University of Alberta "T-Cell Recognition"

FRANK, Cyril, M.D., Ph.D., Department of Surgery, Faculty of Medicine, University of Calgary "Connective Tissue Structure and Function"

FRENCH, Robert, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Ionic Channels in Excitable Membranes"

FRITZLER, Marvin, Ph.D., M.D., Departments of Medicine and Medical Biochemistry, Faculty of Medicine, University of Calgary

"Antinuclear Antibodies in Autoimmune Diseases"

FUJITA, Donald, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Control of Oncogene Activity"

GILES, Wayne, Ph.D., Departments of Medicine and Medical Physiology, Faculty of Medicine, University of Calgary "Electrophysiology of Isolated Cardiac Cells"

GORDON, Tessa, Ph.D., Department of Pharmacology, Faculty of Medicine, University of Alberta "Neuromuscular Plasticity"

GREEN, Douglas, Ph.D., Department of Immunology, Faculty of Medicine, University of Alberta "Immunoregulatory T Cells and Molecules"

GREEN, Francis, M.D., Ph.D., Department of Pathology, Faculty of Medicine, University of Calgary "Mechanisms of Lung Injury by Environmental Agents"

GREENSHAW, Andrew, Ph.D., Department of Psychiatry, Faculty of Medicine, University of Alberta, "Beta-Phenylethylamine, p-Tyramine and p-Octopamine and the Treatment of Affective Disorders"

HART, David, Ph.D., Departments of Medicine and Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Immunochemical Characterization of Plasminogen Activators"

HICKS, T. Philip, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Identification of Synaptic Transmitters in the Mammalian Visual and Somatosensory Systems"

HOFFER, J. Andy, Ph.D., Departments of Medical Physiology and Clinical Neurosciences, Faculty of Medicine, University of Calgary "Neural Control of Movements"

HULBERT, William, Ph.D., Department of Medicine, Faculty of Medicine, University of Alberta "The Effect of $H_2S$ on Airway Structure and Function"

IATROU, Kostas, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "The Organization, Expression and Evolution of Eukaryotic Multigene Families in Chorion of *Bombyx Mori*"

JAWORSKI, Martine, M.D., Department of Pediatrics, Faculty of Medicine, University of Alberta "Pathogenesis of Insulin Dependent Diabetes Mellitus"

JENSEN, Susan, Ph.D., Department of Medical Microbiology and Infectious Diseases, Faculty of Science, University of Alberta "Biosynthesis of Novel Penicillin and Cephalosporin Antibiotics"

JUGDUTT, Bodh, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Modification of Ventricular Shape and Function During Healing After Myocardial Infarction"

KAUFMAN, Susan, Ph.D., Department of Medicine, Faculty of Medicine, University of Alberta "Control Mechanisms of Fluid and Electrolyte Balance"

KING, Malcolm, Ph.D., Department of Medicine, Faculty of Medicine, University of Alberta "Studies on Mucus Clearance"

KOOPMANS, Henry, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "The Internal Control of Food Intake"

LAFRENIERE, Rene, M.D., Department of Surgery, Faculty of Medicine, University of Calgary "Adoptive Immunotherapy of Tumors with Activated Lymphocytes and Biological Response Modifiers"

LAU, David, M.D., Ph.D., Department of Medicine, Faculty of Medicine, University of Calgary "Regulation of Adipose Tissue Development and Growth"

LEE, Patrick, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "The Mechanism of Virus Attachment of Host Cells"

*LEUNG, Wai-Choi, Ph.D., Departments of Medicine and Medical Microbiology and Infectious Diseases, Faculty of Medicine, University of Alberta "Molecular Cloning of Viral Neutralization Antigen and Human Tumor Antigen"

LORD, Catherine, Ph.D., Department of Pediatrics, Faculty of Medicine, University of Alberta "Sex Differences in Autism"

MacVICAR, Brian, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Neuronal Basis for Synchrony During Seizure"

MANTLE, Michèle, Ph.D., Departments of Medical Biochemistry and Pediatrics, Faculty of Medicine, University of Calgary "Structure, Synthesis and Secretion of Intestinal Mucus"

MARANDA, Bruno, Ph.D., Department of Surgery, Faculty of Medicine, University of Alberta "Immuno-Cytochemical Investigation of Axonal Transport"

MARTIN, Renee, Ph.D., Department of Pediatrics, Faculty of Medicine, University of Calgary "Cytogenetic Analysis of Human Sperm"

*MATHESON, David, M.D., Departments of Pediatrics and Internal Medicine, Faculty of Medicine, University of Calgary "Cellular Regulation of Immune Responses"

McFADDEN, Grant, Ph.D., Department of

Biochemistry, Faculty of Medicine, University of Alberta "Molecular Biology of Tumorogenic Shope Fibroma Poxviruses"

McGARRY, Ronald, Ph.D., Department of Pediatrics, Faculty of Medicine, University of Calgary "Functional Role of MAG"

McPHERSON, David, M.D., Department of Internal Medicine, Faculty of Medicine, University of Calgary "Cardiac Evaluation with Ultrasound"

MILOS, Nadine, Ph.D., Department of Anatomy and Cell Biology, Faculty of Medicine, University of Alberta "Factors Controlling Pattern Formation by Neural Crest Cells"

*MINUK, Gerald, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Role of GABA in Liver Disease"

MOORE, Graham, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "The Synthesis and Evaluation of Peptide Hormones and Analogues"

MORTIMER, David, Ph.D., Departments of Obstetrics and Gynecology and Medical Physiology, Faculty of Medicine, University of Calgary "Human Sperm Physiology and Infertility"

PALCIC, Monica, Ph.D., Department of Food Science, Faculty of Agriculture/Forestry, University of Alberta "Enzyme Inhibitors as Therapeutic Agents"

PARHAD, Irma, M.D., Departments of Pathology and Clinical Neurosciences, Faculty of Medicine, University of Calgary "Neurofibrillary Degeneration: Pathogenic Mechanisms"

*PARSONS, Howard, M.D., Department of Pediatrics, Faculty of Medicine, University of Calgary "Energy Expenditure and Fatty Acid Metabolism"

PITTMAN, Quentin, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Peptide Neurotransmission in Brain"

PREIKSAITIS, Jutta, M.D., Departments of Medicine and Medical Microbiology and Infectious Diseases, Faculty of Medicine, University of Alberta "Transfusion Acquired Cytomegalovirus Infection: Epidemiology and Immune Response in Man"

PROCHAZKA, Arthur, Ph.D., Department of Physiology, Faculty of Medicine, University of Alberta "Neural Control of Mammalian Movement"

QUANDT, Fred, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Electrical Properties of Isolated Retinal Neurons"

RAMCHARAN, Savitri, M.D., Ph.D., Department of Community Health Sciences, Faculty of Medicine, University of Calgary "Epidemiologic Studies of the Menstrual Cycle and PMS"

RATTNER, Jerome, Ph.D., Departments of Medical Biochemistry and Anatomy, Faculty of Medicine, University of Calgary "High Order Structure of Chromosomes"

REH, Thomas, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Regeneration of Optic Nerve"

REHA-KRANTZ, Linda, Ph.D., Department of Genetics, Faculty of Science, University of Alberta "The Biochemical Basis of Mutation"

REYNOLDS, John, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Studies of the Intestinal Immune System"

RORSTAD, Otto, M.D., Ph.D., Department of Medicine, Faculty of Medicine, University of Calgary "Mechanisms of Action of Brain Peptides"

SCHNEIDER, Wolfgang, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta "Receptor-Mediated Endocytosis in Oocytes"

SCHNETKAMP, Paul, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Visual Transduction in Rod Photoreceptors"

SCHÜRCH, Samuel, Ph.D., Departments of Medicine and Medical Physiology, Faculty of Medicine, University of Calgary "Lung Stability and Cell Adhesion"

SEVERSON, David, Ph.D., Department of Pharmacology and Therapeutics, Faculty of Medicine, University of Calgary "Lipid Metabolism in Heart and Blood Vessels"

SINGH, Bhagirath, Ph.D., Department of Immunology, Faculty of Medicine, University of Alberta "Mechanism and Regulation of Antigen Recognition by T-Lymphocytes"

SMITH, Peter, Ph.D., Department of Pharmacology, Faculty of Medicine, University of Alberta "Electrophysiological Studies of the Electrogenic Sodium Pump in Sympathetic Ganglia and Spinal Cord"

SNYDER, Floyd, Ph.D., Departments of Medical Biochemistry and Pediatrics, Faculty of Medicine, University of Calgary "Studies of Inherited Disorders of Nucleotide Metabolism"

SOKOL, Pamela, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Role of Iron in the Pathology of Pseudomonas Infection"

STOCKBRIDGE, Norman, M.D., Ph.D., Department of Surgery, Faculty of Medicine, University of Alberta "Signal Processing by Neurons"

TAYLOR, Diane, Ph.D., Department of Medical Microbiology and Infectious Diseases, Faculty of Medicine, University of Alberta "Characterization of Bacterial Plasmids"

TRAYHURN, Paul, Ph.D., Departments of Medicine and Foods and Nutrition, Faculty of Medicine, University of Alberta "Regulation of Energy Balance"

VOGEL, Hans, Ph.D., Department of Biochemistry and Biological Sciences, Faculty of Science, University of Calgary "NMR Studies of Mechanistic and Regulatory Aspects of Metabolism"

WAISMAN, David, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Studies of Calcium Binding Proteins"

WALSH, Michael, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Enzyme Regulation by Calcium"

WENMAN, Wanda, M.D., Department of Pediatrics, Faculty of Medicine, University of Alberta "Human Infections with *Chlamydia Trachomatis*"

WITKOWSKI, Francis, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Autonomic Neural Influences in Arrhythmogenesis"

WONG, Sui-Lam, Ph.D., Department of Biological Sciences, Faculty of Science, University of Calgary "Gene Regulation and Secretion in *Bacillus Subtilis*"

WOODS, Donald, Ph.D., Department of Microbiology & Infectious Diseases, Faculty of Medicine, University of Calgary "Pathogenesis of *Pseudomonas Aeruginosa* Disease"

WYSE, George, Ph.D., M.D., Departments of Medicine and Pharmacology and Therapeutics, Faculty of Medicine, University of Calgary "Investigations in Hypertension and Electrophysiology"

## Heritage Clinical Investigators

**1987-88 Additions:**

BERTHIAUME, Yves, M.D., Department of Medicine, Faculty of Medicine, University of Calgary, "Mechanisms of Alveolar Liquid Clearance"

HO, May, M.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary, "Immunoregulation in *P. Falciparum* Malaria"

KNETEMAN, Norman, M.D., Department of Surgery, Faculty of Medicine, University of Alberta, "Islet Isolation, Immunodulation and Immunosuppression"

LIEN, Dale, M.D., Department of Medicine, Faculty of Medicine, University of Alberta, "Neutrophils in Airway Inflammation"

MEDDINGS, Johnathan , M.D., Department of Medicine, Faculty of Medicine, University of Calgary, "Physiology of Intestinal Permeability"

**Current:**

BEAUCHENE, James, M.D., Department of Surgery, Faculty of Medicine, University of Alberta "Biological Basis of Therapeutic Tissue Expansion"

COE, James, M.D., Department of Pediatrics, Faculty of Medicine, University of Alberta "Pharmacological Manipulation of the Neonatal Circulation"

FEDORAK, Richard, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Adaptation and Regulation of Intestinal Glucose Transport"

FLETCHER, William, M.D., Department of Clinical Neurosciences, Faculty of Medicine, University of Calgary "Visual Motor Dysfunction with Frontal Lobe Lesions"

GILL, Michael, M.D., Departments of Microbiology and Infectious Diseases and Medicine, Faculty of Medicine, University of Calgary "Investigations of Viral Pathogenesis"

GILLIS, Anne, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Myocardial Kinetics and Pharmacodynamics"

MACLEAN, Grant, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Monoclonal Antibodies in Small Cell Lung Cancer"

RYAN, Edmond, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Insulin Resistance in Pregnancy"

SCOTT, R. Brent, M.D., Department of Pediatrics, Faculty of Medicine, University of Calgary "Gastrointestinal Motor Function"

VAN AERDE, Johny, M.D., Department of Pediatrics, Faculty of Medicine, University of Alberta "Fat Utilization in Parenterally Fed Newborn Infants"

WARNOCK, Garth, M.D., Department of Surgery, Faculty of Medicine, University of Alberta "Transplantation of Human Islets of Langerhans"

*funded by AHFMR under this award for only part of 1987/88

Design by Roberts Hoffman Young Graphic Design Inc. Printing by Alpine Press